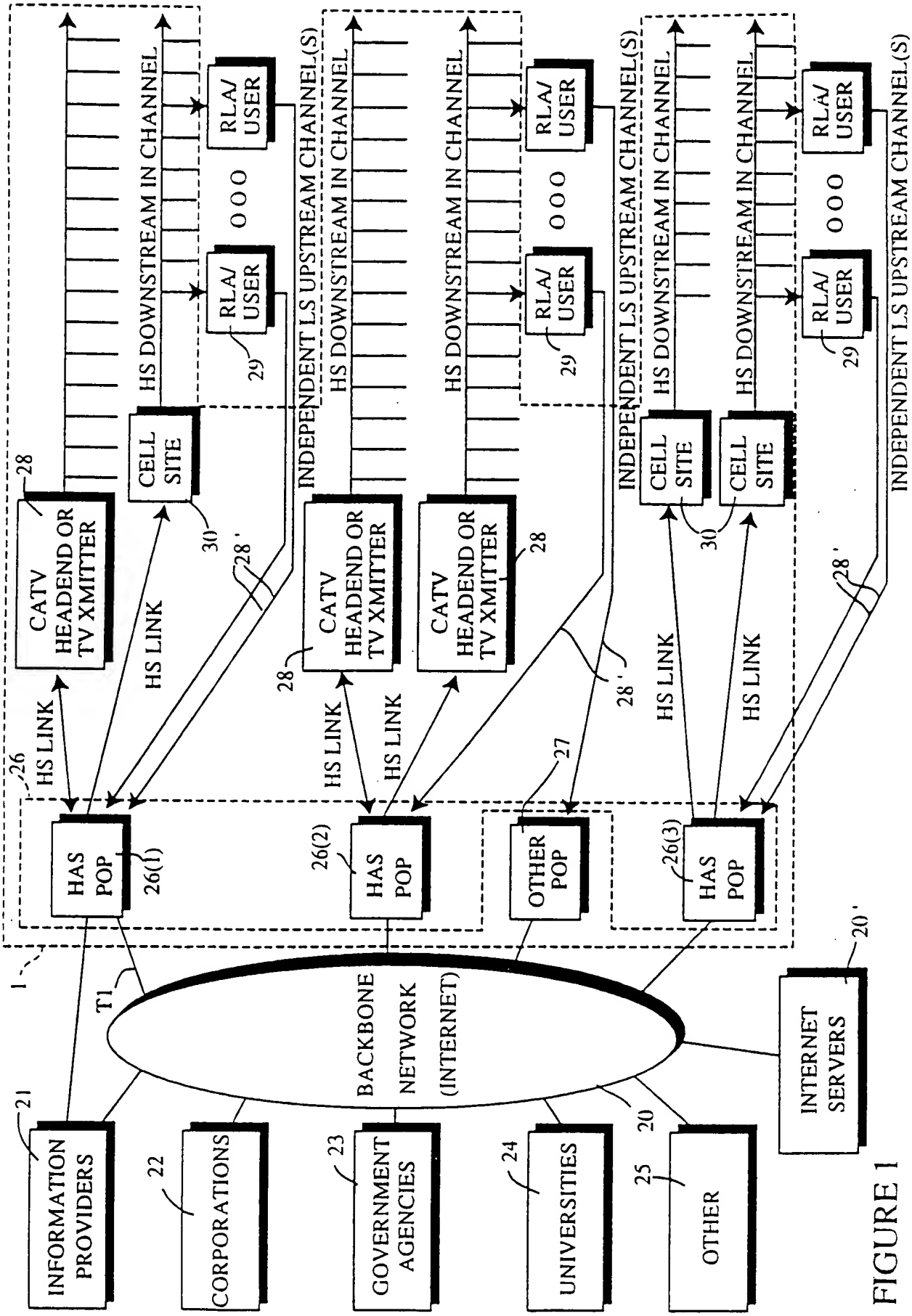
INFORMATION PROVIDERS
21
CORPORATIONS
22
GOVERNMENT AGENCIES
23
UNIVERSITIES
24
OTHER
25
20
BACKBONE NETWORK (INTERNET)
T1
1
INTERNET SERVERS
20'
HAS POP
26(1)
HAS POP
26(2)
OTHER POP
27
HAS POP
26(3)
26
HS LINK
CATV HEADEND OR TV XMITTER
28
CELL SITE
30
HS DOWNSTREAM IN CHANNEL
INDEPENDENT LS UPSTREAM CHANNEL(S)
28'
RLA/ USER
29
O O O

FIGURE 1

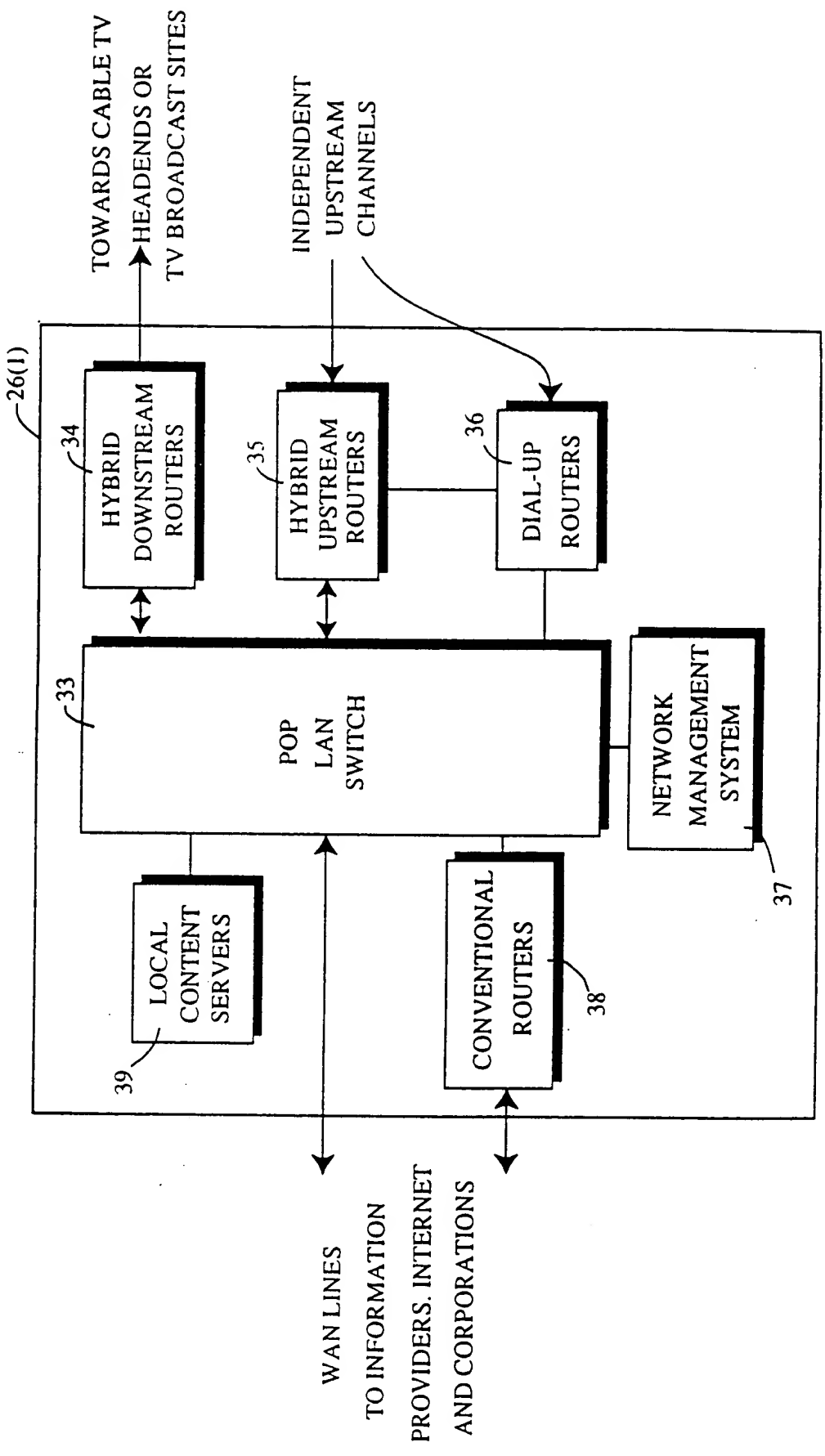
TOWARDS CABLE TV
HEADENDS OR
TV BROADCAST SITES
INDEPENDENT
UPSTREAM
CHANNELS
26(1)
34
HYBRID
DOWNSTREAM
ROUTERS
35
HYBRID
UPSTREAM
ROUTERS
36
DIAL-UP
ROUTERS
33
POP
LAN
SWITCH
NETWORK
MANAGEMENT
SYSTEM
37
LOCAL
CONTENT
SERVERS
39
CONVENTIONAL
ROUTERS
38
WAN LINES
TO INFORMATION
PROVIDERS. INTERNET
AND CORPORATIONS

FIGURE 2a

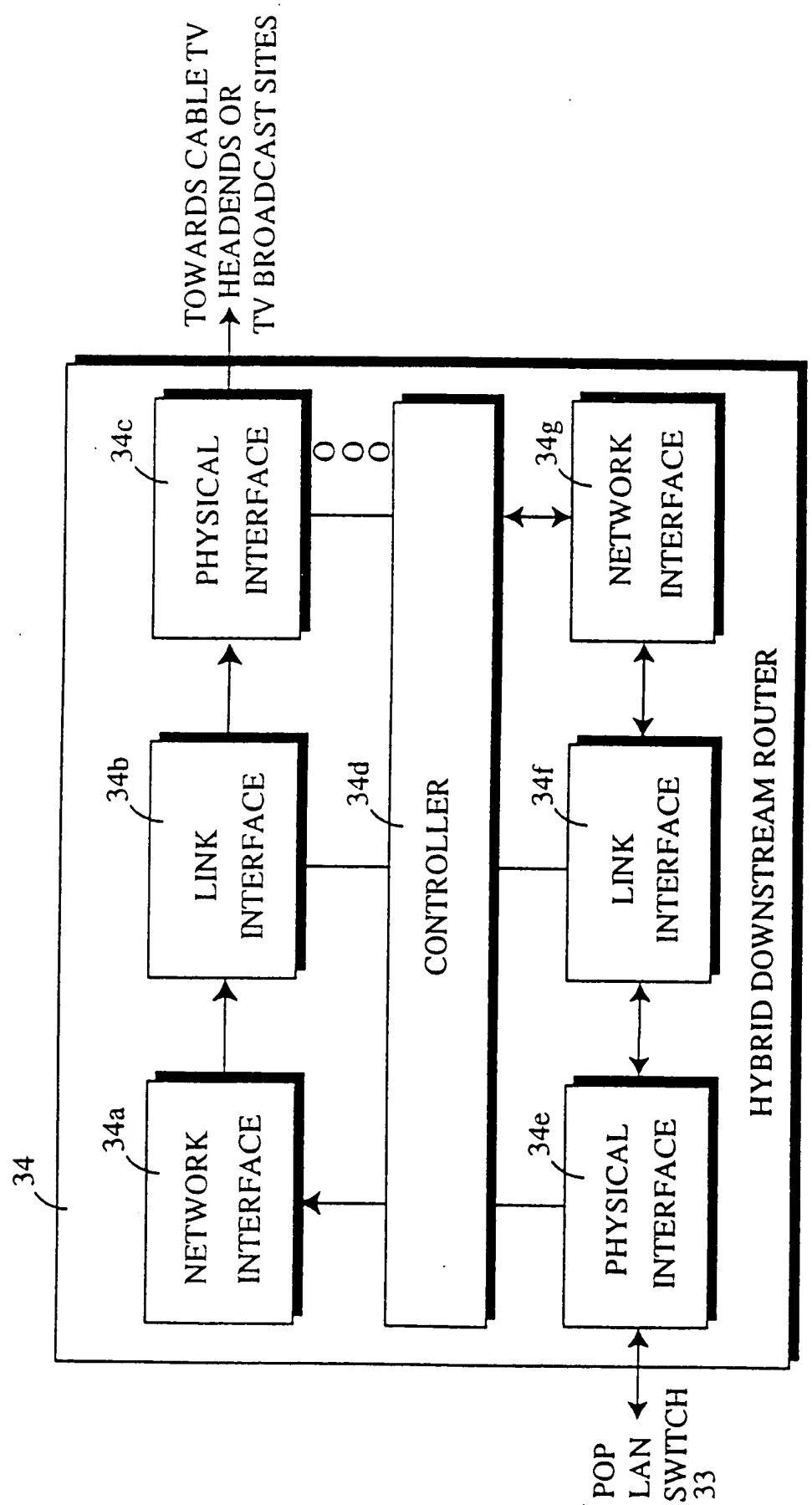
TOWARDS CABLE TV
HEADENDS OR
TV BROADCAST SITES
34
34a
NETWORK
INTERFACE
34b
LINK
INTERFACE
34c
PHYSICAL
INTERFACE
34d
CONTROLLER
34e
PHYSICAL
INTERFACE
34f
LINK
INTERFACE
34g
NETWORK
INTERFACE
HYBRID DOWNSTREAM ROUTER
POP
LAN
SWITCH
33

FIGURE 2b

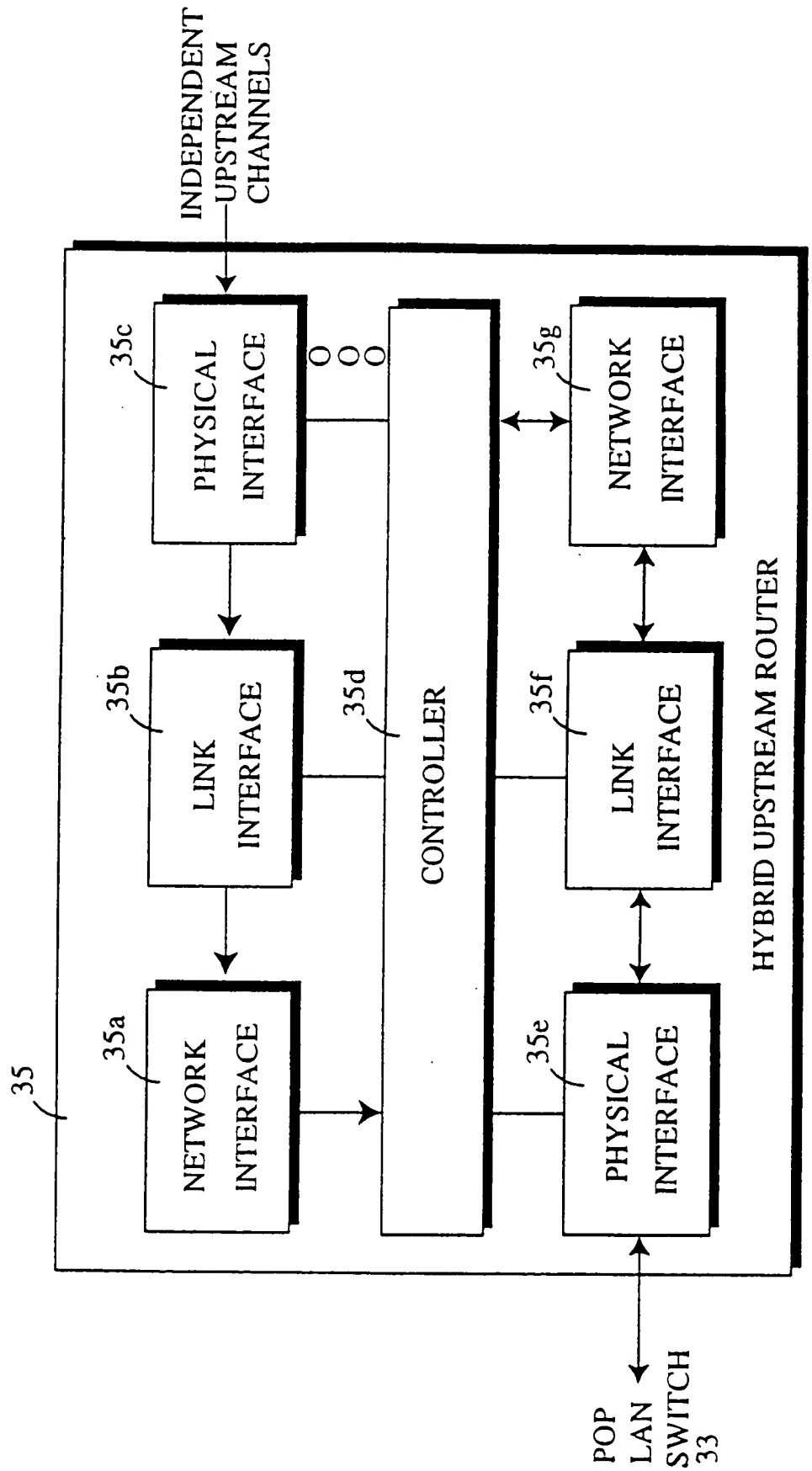
INDEPENDENT UPSTREAM CHANNELS
35
35a
NETWORK INTERFACE
35b
LINK INTERFACE
35c
PHYSICAL INTERFACE
35d
CONTROLLER
35e
PHYSICAL INTERFACE
35f
LINK INTERFACE
35g
NETWORK INTERFACE
HYBRID UPSTREAM ROUTER
POP LAN SWITCH 33

FIGURE 2c

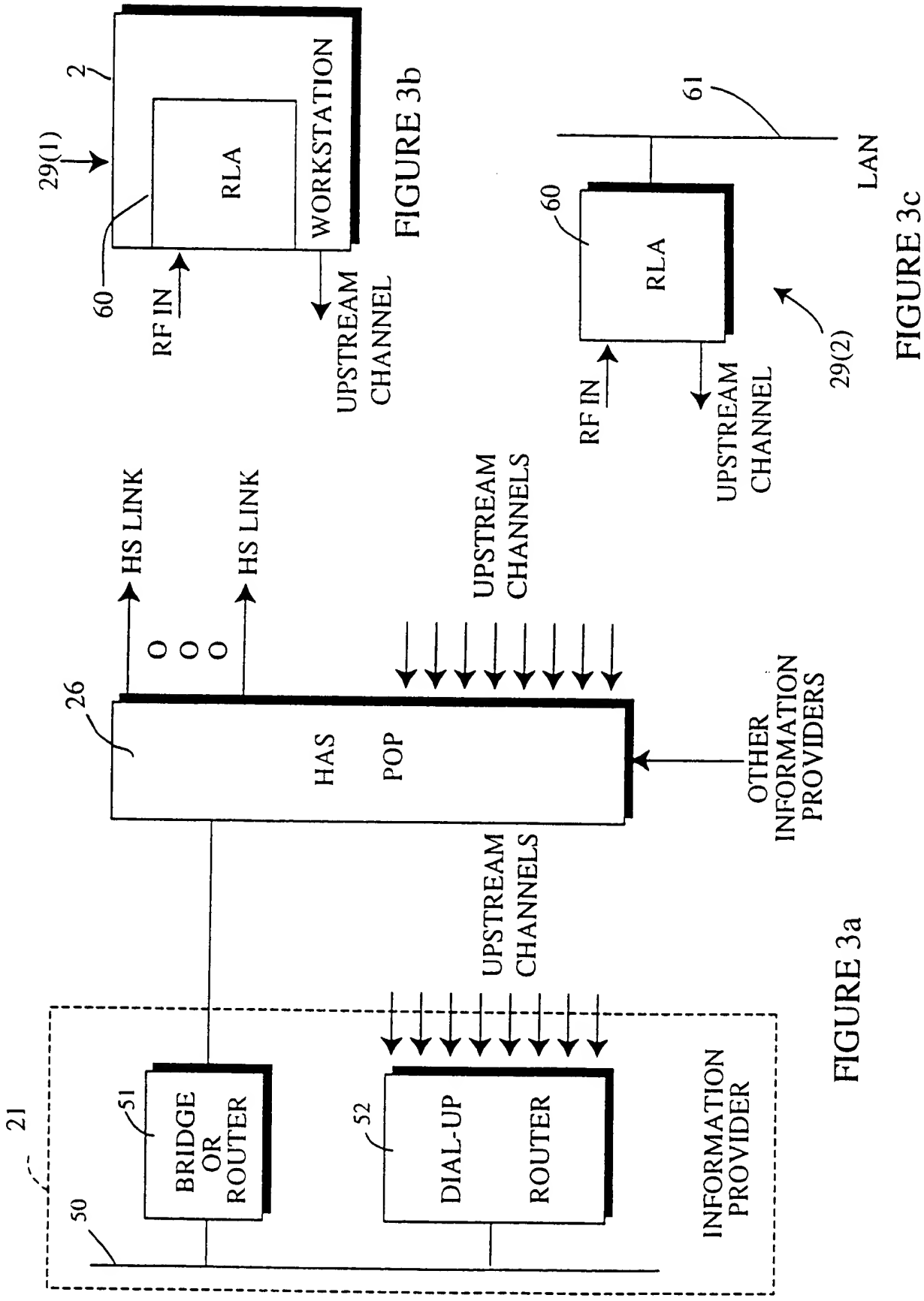

FIGURE 3a

FIGURE 3c

FIGURE 3b

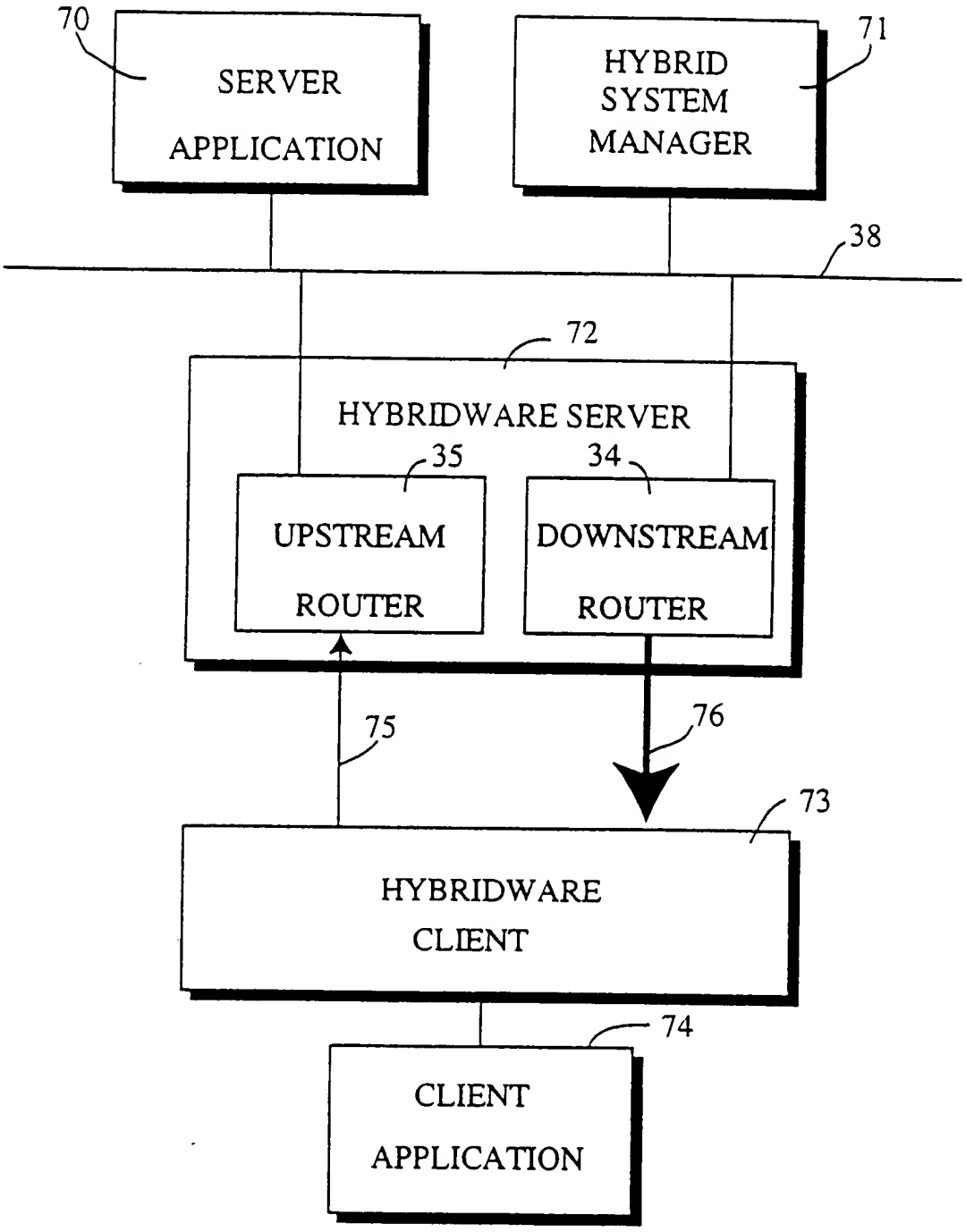
70
SERVER APPLICATION
71
HYBRID SYSTEM MANAGER
38
72
HYBRIDWARE SERVER
35
34
UPSTREAM ROUTER
DOWNSTREAM ROUTER
75
76
73
HYBRIDWARE CLIENT
74
CLIENT APPLICATION

FIGURE 4

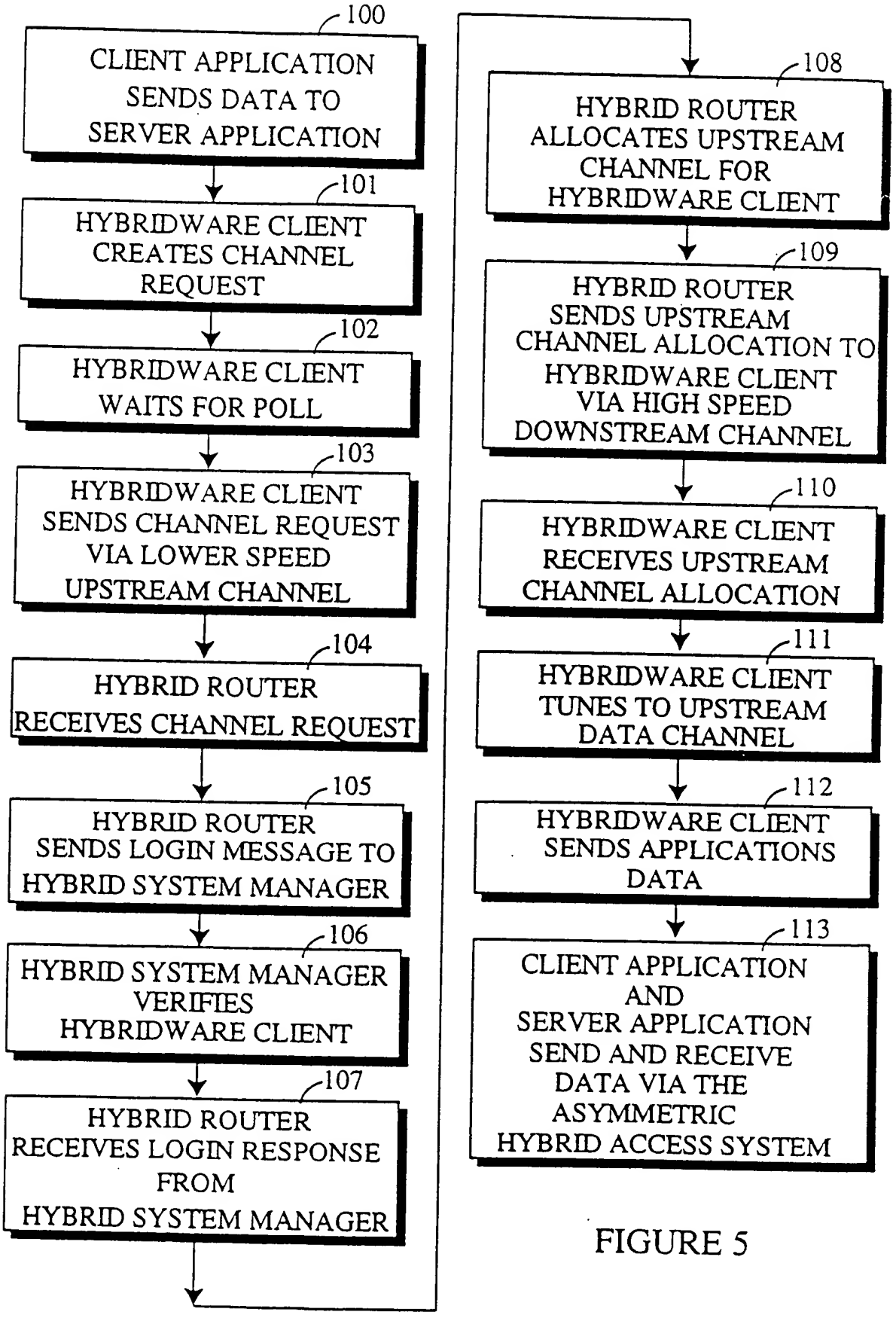
100
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
101
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
102
HYBRIDWARE CLIENT WAITS FOR POLL
103
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED UPSTREAM CHANNEL
104
HYBRID ROUTER RECEIVES CHANNEL REQUEST
105
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
106
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
107
HYBRID ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
108
HYBRID ROUTER ALLOCATES UPSTREAM CHANNEL FOR HYBRIDWARE CLIENT
109
HYBRID ROUTER SENDS UPSTREAM CHANNEL ALLOCATION TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
110
HYBRIDWARE CLIENT RECEIVES UPSTREAM CHANNEL ALLOCATION
111
HYBRIDWARE CLIENT TUNES TO UPSTREAM DATA CHANNEL
112
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
113
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 5

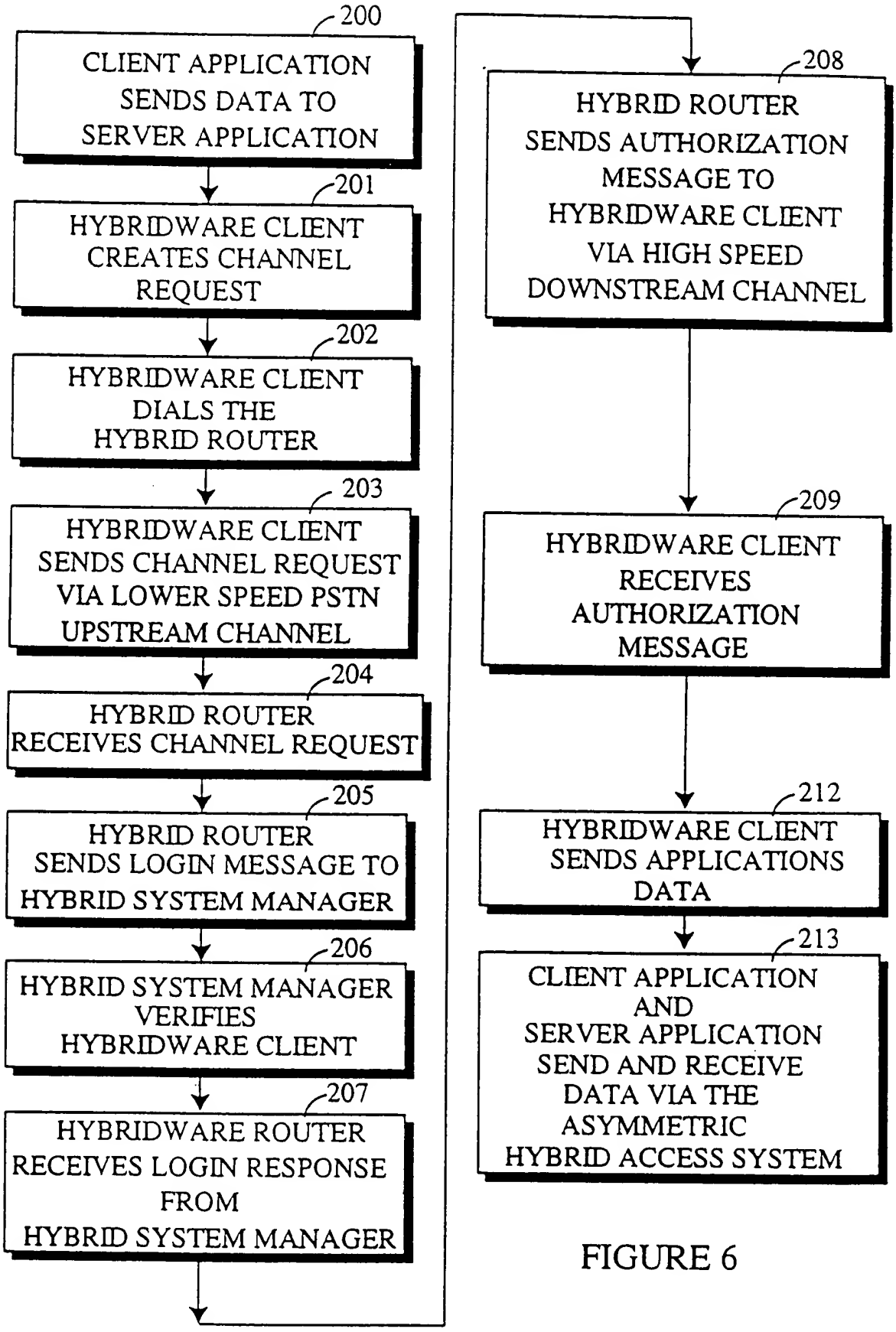
200
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
201
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
202
HYBRIDWARE CLIENT DIALS THE HYBRID ROUTER
203
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED PSTN UPSTREAM CHANNEL
204
HYBRID ROUTER RECEIVES CHANNEL REQUEST
205
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
206
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
207
HYBRIDWARE ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
208
HYBRID ROUTER SENDS AUTHORIZATION MESSAGE TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
209
HYBRIDWARE CLIENT RECEIVES AUTHORIZATION MESSAGE
212
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
213
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 6

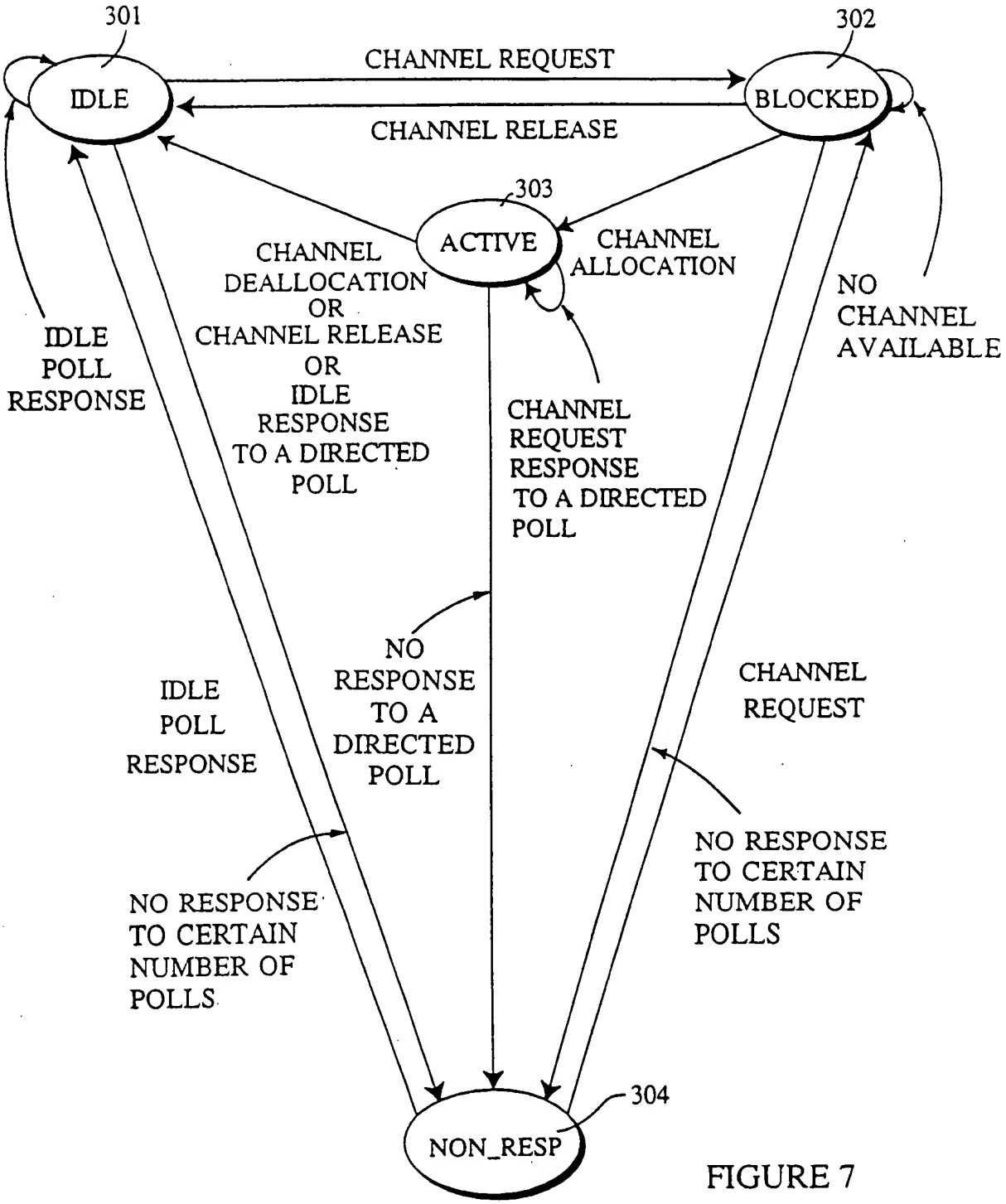
301
302
IDLE
CHANNEL REQUEST
BLOCKED
CHANNEL RELEASE
303
ACTIVE
CHANNEL DEALLOCATION OR CHANNEL RELEASE OR IDLE RESPONSE TO A DIRECTED POLL
CHANNEL ALLOCATION
IDLE POLL RESPONSE
NO CHANNEL AVAILABLE
CHANNEL REQUEST RESPONSE TO A DIRECTED POLL
NO RESPONSE TO A DIRECTED POLL
IDLE POLL RESPONSE
CHANNEL REQUEST
NO RESPONSE TO CERTAIN NUMBER OF POLLS
NO RESPONSE TO CERTAIN NUMBER OF POLLS
304
NON_RESP

FIGURE 7

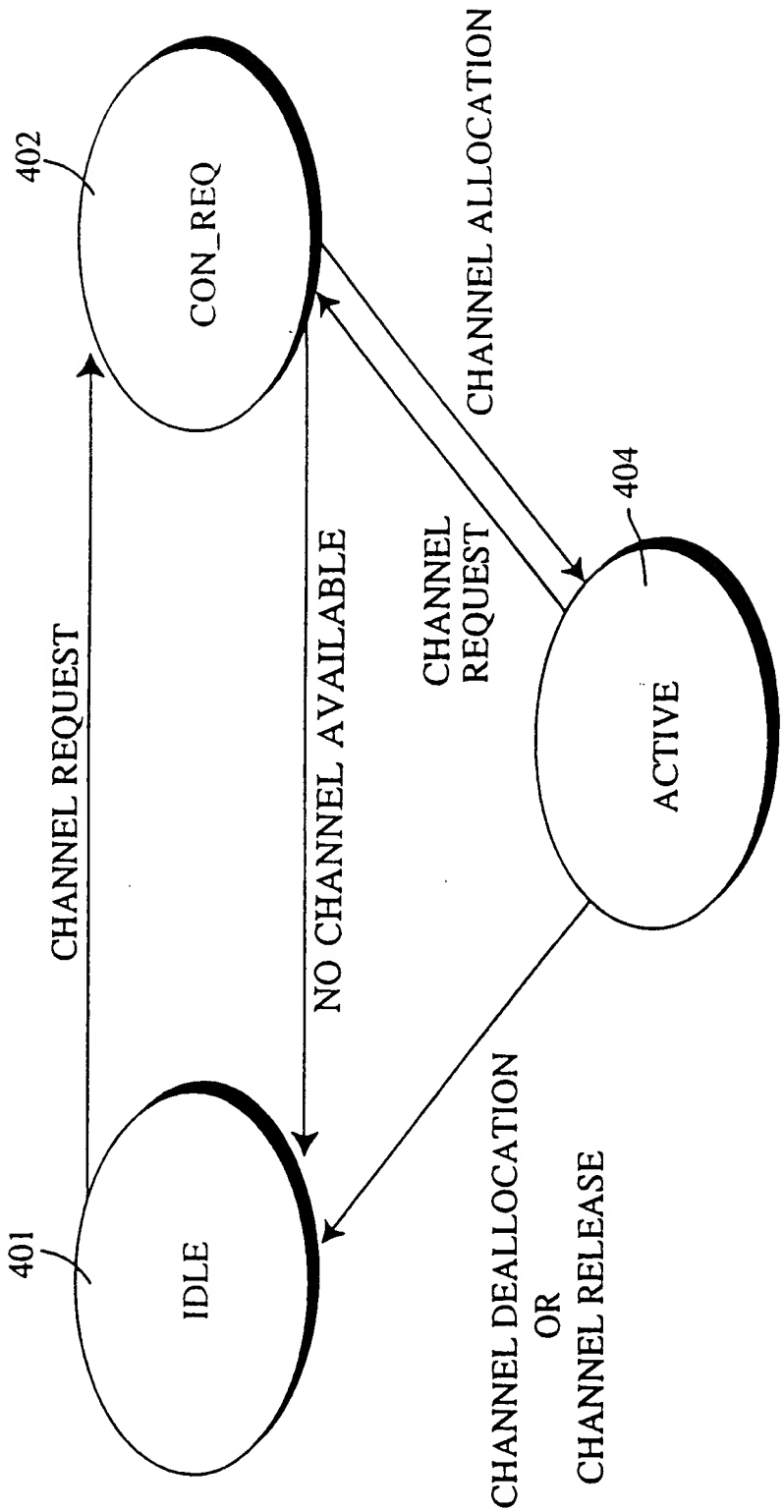
402
CON_REQ
CHANNEL ALLOCATION
404
CHANNEL REQUEST
ACTIVE
CHANNEL REQUEST
NO CHANNEL AVAILABLE
401
IDLE
CHANNEL DEALLOCATION
OR
CHANNEL RELEASE

FIGURE 8

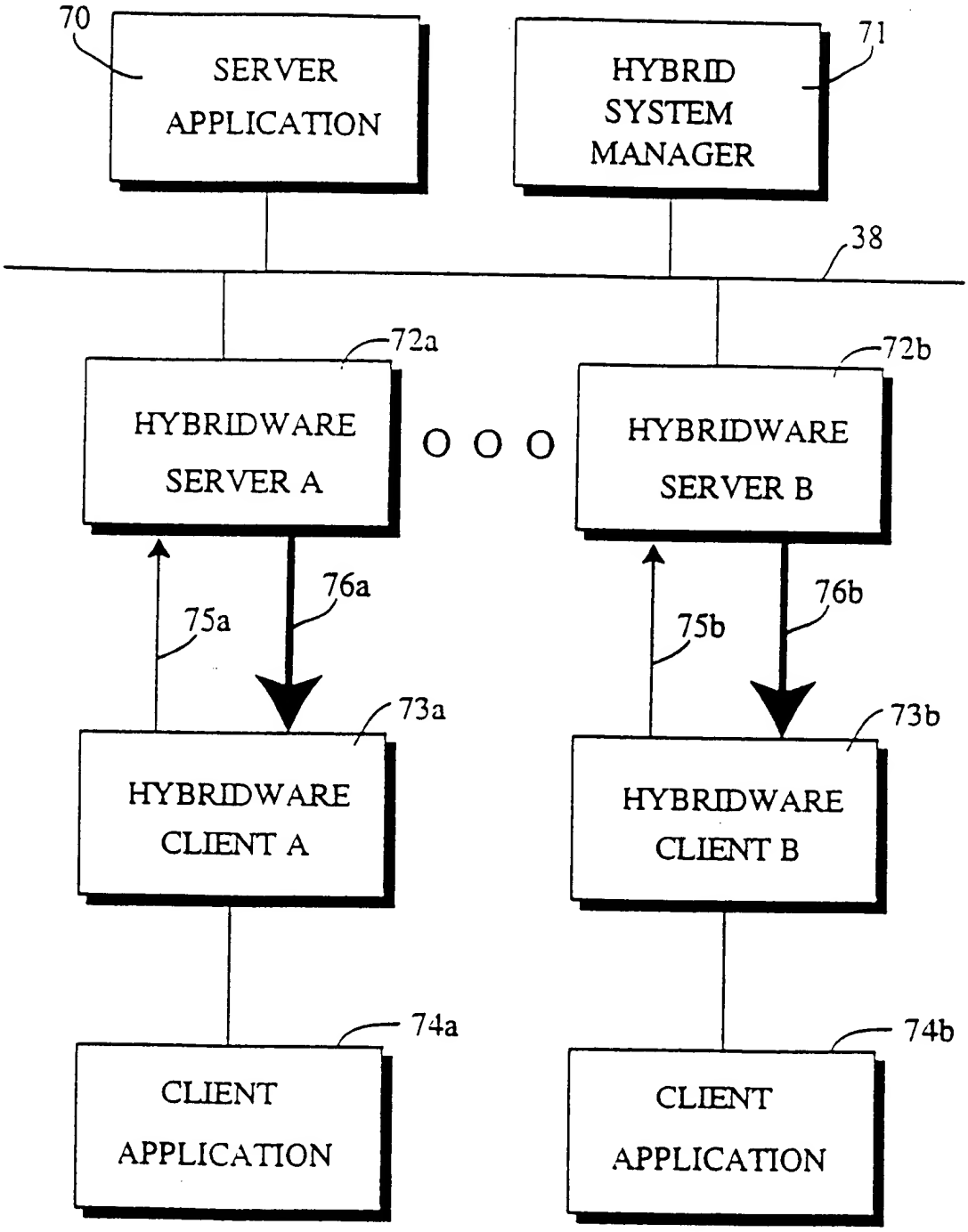
70
SERVER APPLICATION
71
HYBRID SYSTEM MANAGER
38
72a
HYBRIDWARE SERVER A
O O O
72b
HYBRIDWARE SERVER B
75a
76a
75b
76b
73a
HYBRIDWARE CLIENT A
73b
HYBRIDWARE CLIENT B
74a
CLIENT APPLICATION
74b
CLIENT APPLICATION

FIGURE 9

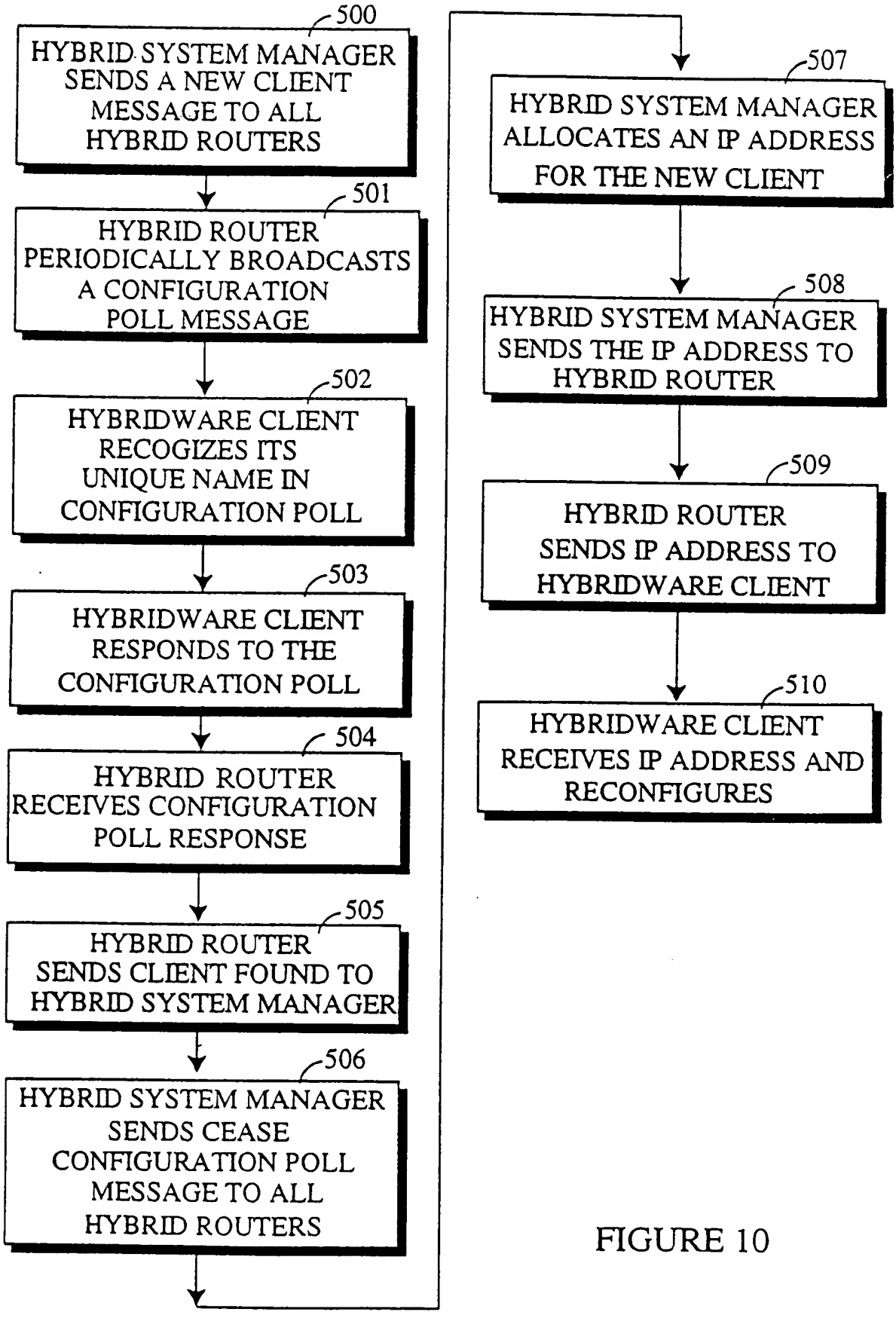
500
HYBRID SYSTEM MANAGER SENDS A NEW CLIENT MESSAGE TO ALL HYBRID ROUTERS
501
HYBRID ROUTER PERIODICALLY BROADCASTS A CONFIGURATION POLL MESSAGE
502
HYBRIDWARE CLIENT RECOGIZES ITS UNIQUE NAME IN CONFIGURATION POLL
503
HYBRIDWARE CLIENT RESPONDS TO THE CONFIGURATION POLL
504
HYBRID ROUTER RECEIVES CONFIGURATION POLL RESPONSE
505
HYBRID ROUTER SENDS CLIENT FOUND TO HYBRID SYSTEM MANAGER
506
HYBRID SYSTEM MANAGER SENDS CEASE CONFIGURATION POLL MESSAGE TO ALL HYBRID ROUTERS
507
HYBRID SYSTEM MANAGER ALLOCATES AN IP ADDRESS FOR THE NEW CLIENT
508
HYBRID SYSTEM MANAGER SENDS THE IP ADDRESS TO HYBRID ROUTER
509
HYBRID ROUTER SENDS IP ADDRESS TO HYBRIDWARE CLIENT
510
HYBRIDWARE CLIENT RECEIVES IP ADDRESS AND RECONFIGURES

FIGURE 10

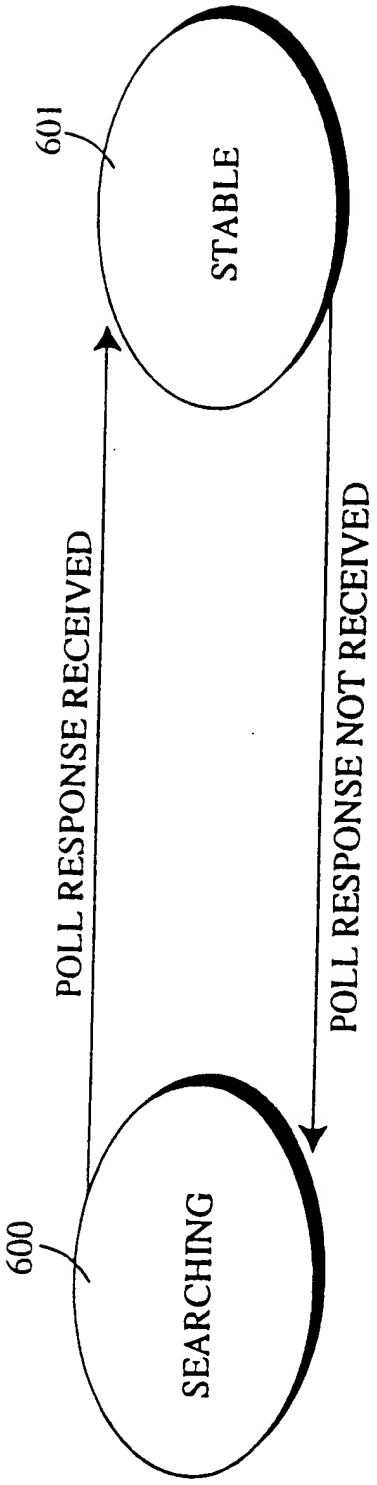
601
STABLE
POLL RESPONSE RECEIVED
POLL RESPONSE NOT RECEIVED
600
SEARCHING

FIGURE 11

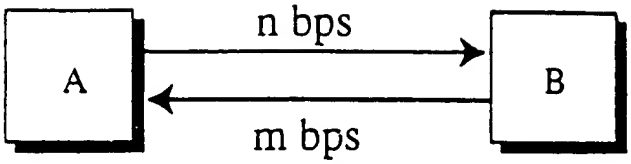

FIGURE 12a
PRIOR ART

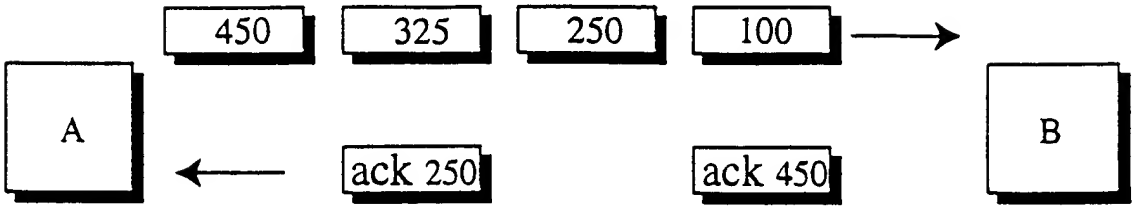

FIGURE 12b
PRIOR ART

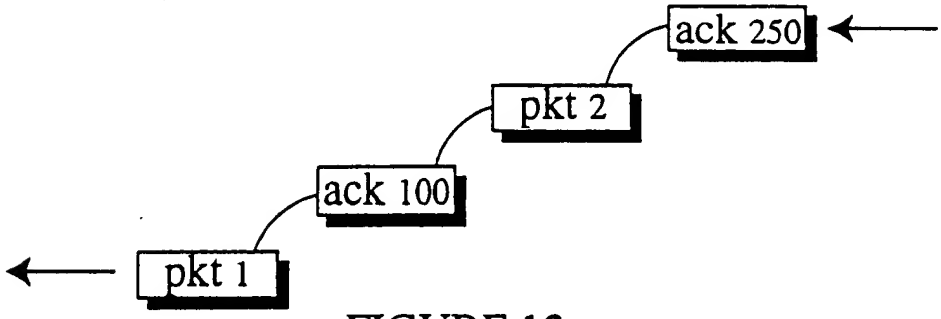

FIGURE 12c

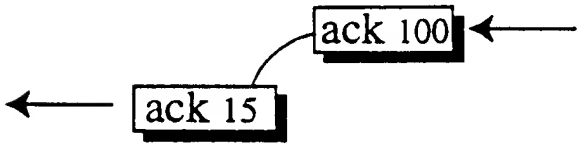

FIGURE 12d

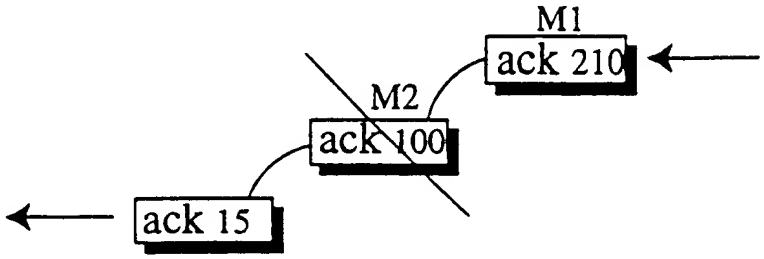

FIGURE 12e

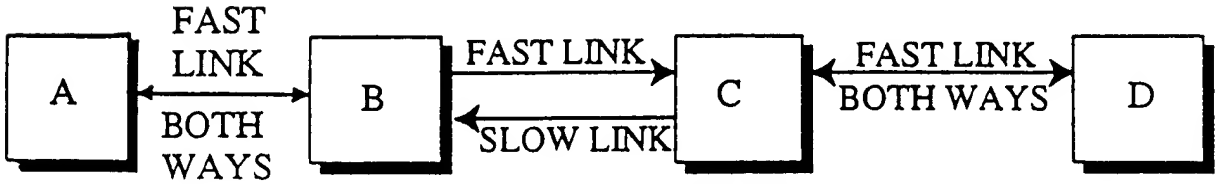

FIGURE 12f

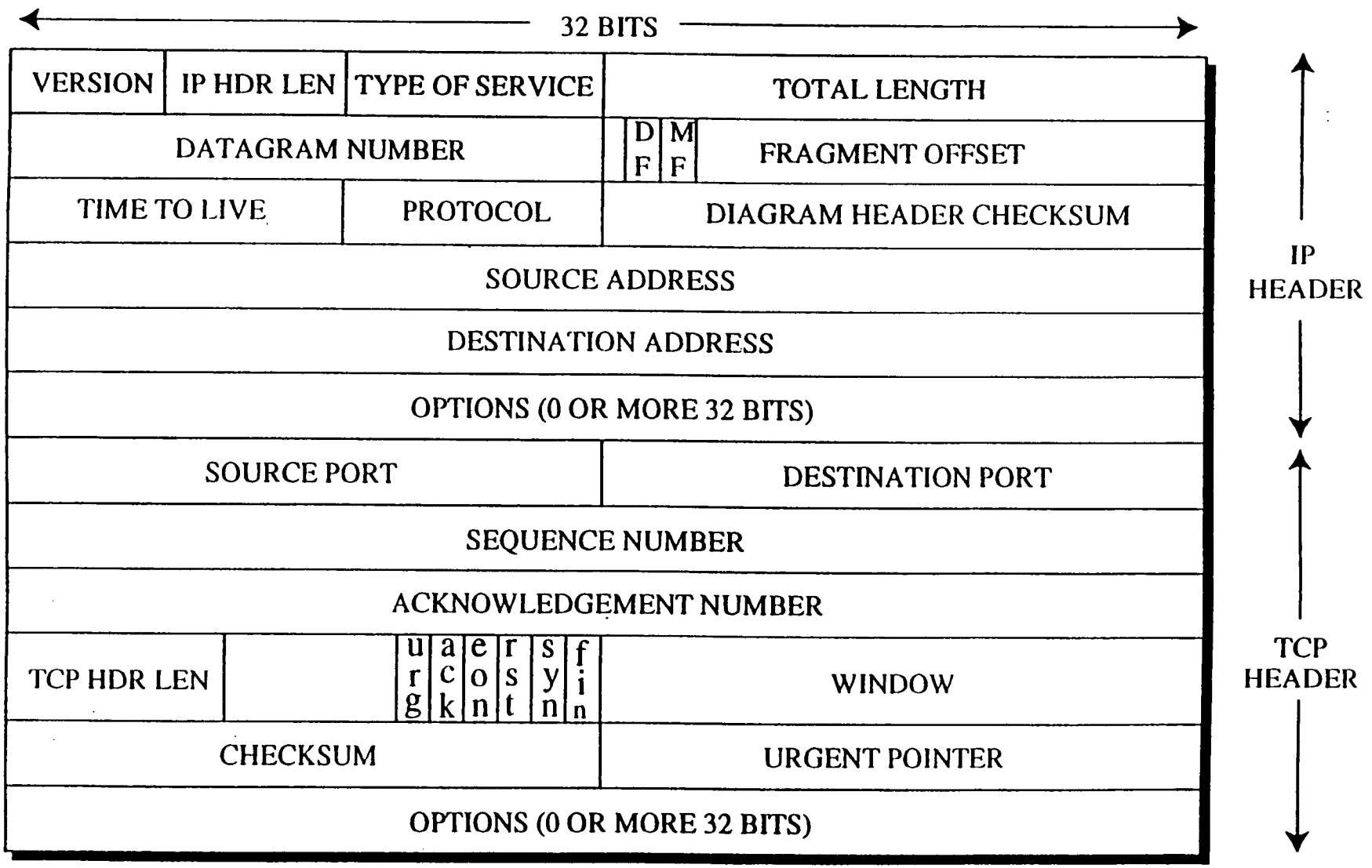

FIGURE 13

Serial No. 08/697,080
Group Art Unit 2603

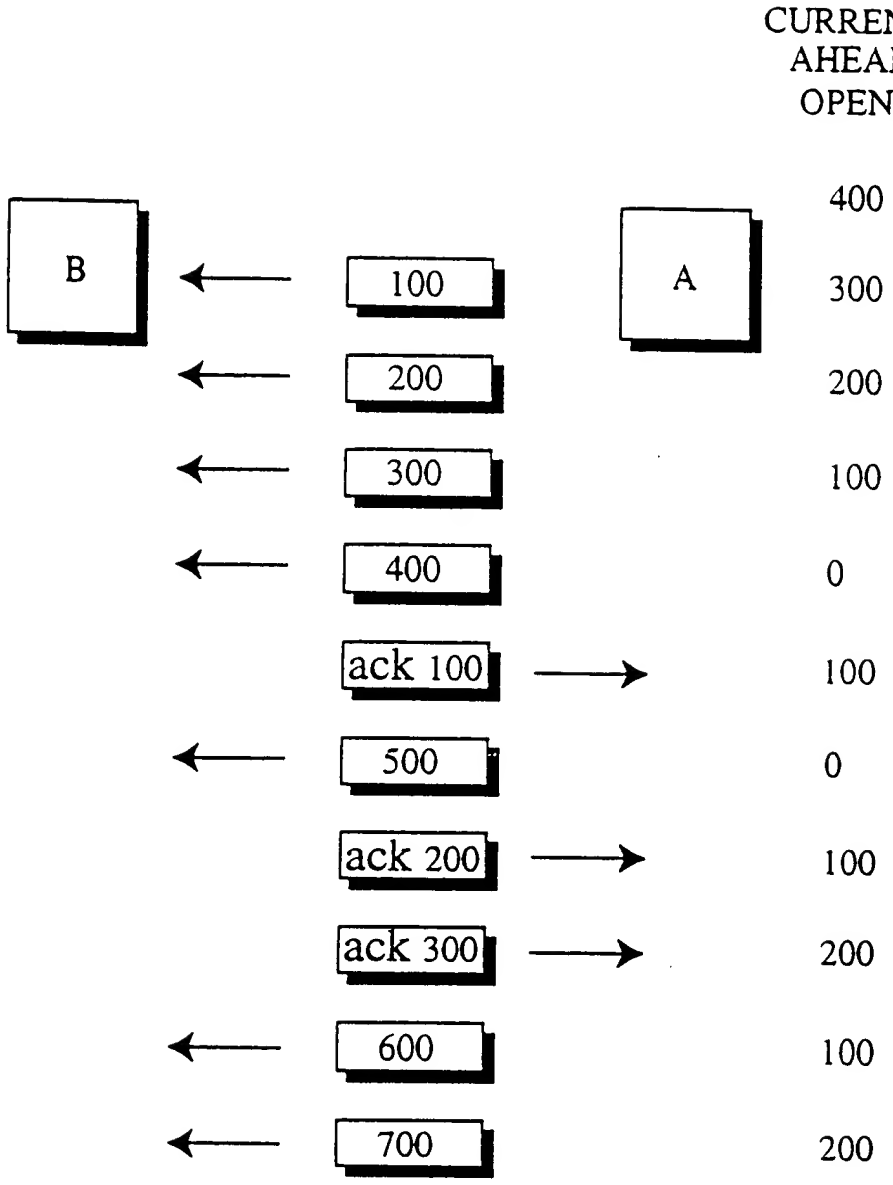

FIGURE 14a

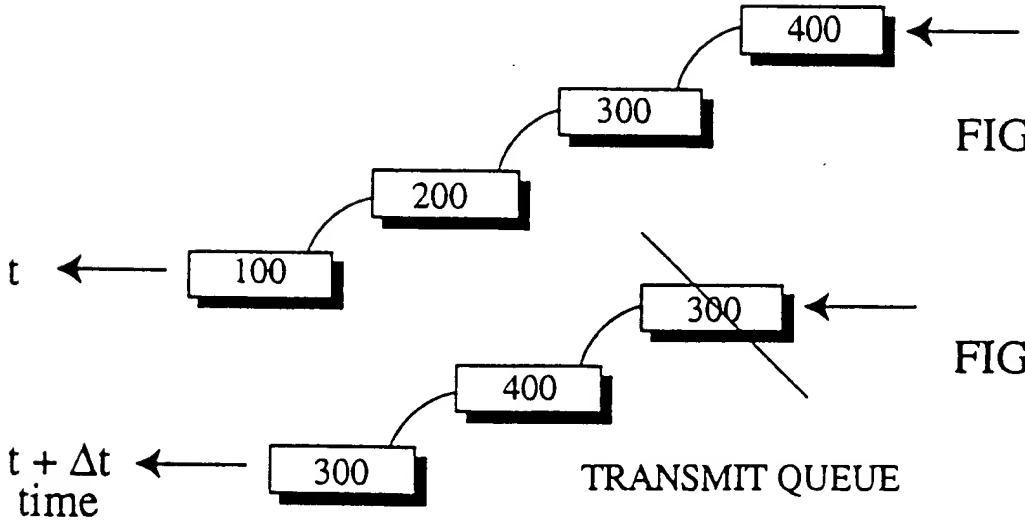

FIGURE 14b

FIGURE 14c

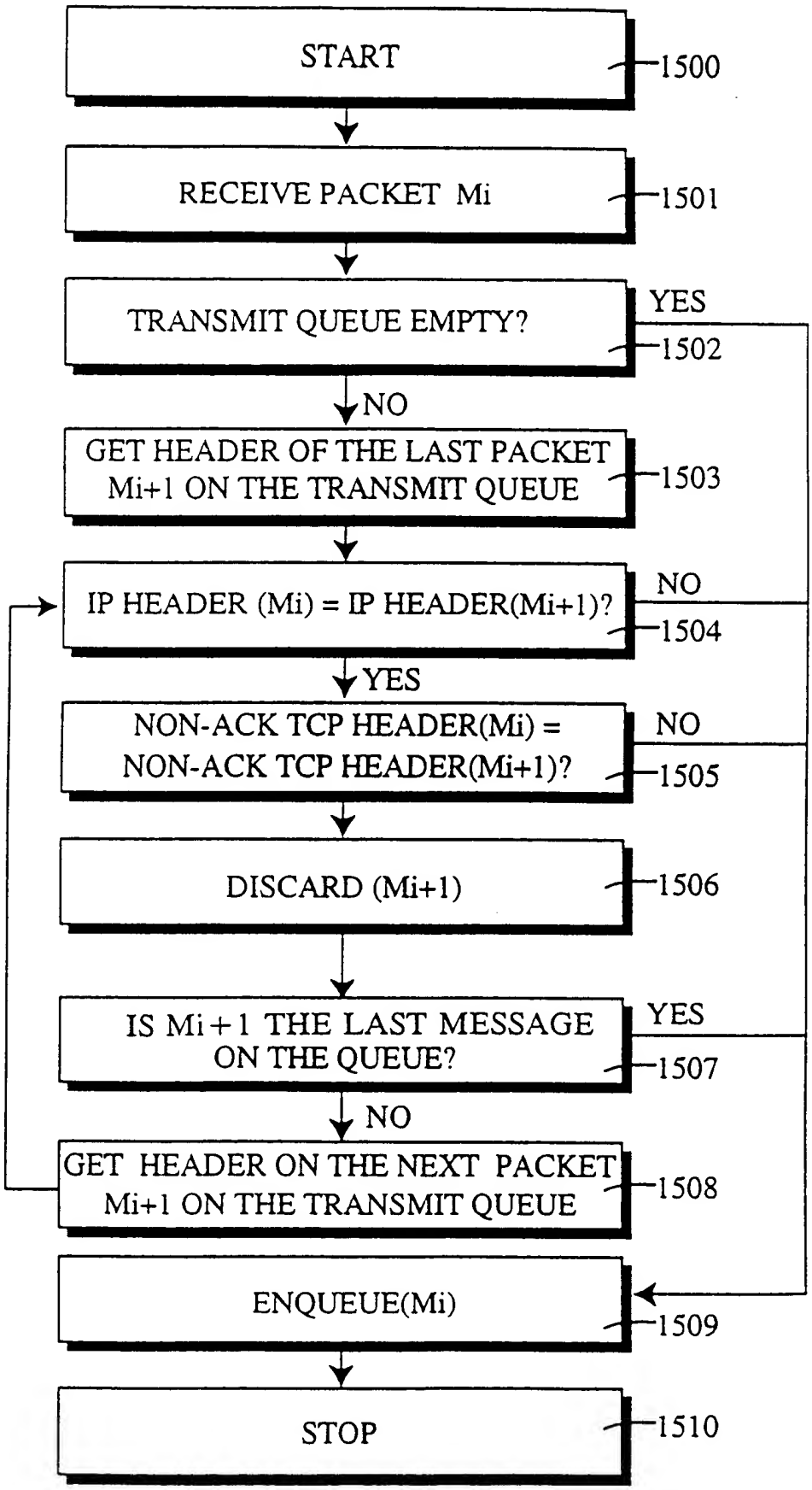
START
1500
RECEIVE PACKET Mi
1501
TRANSMIT QUEUE EMPTY?
YES
1502
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1503
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1504
YES
NON-ACK TCP HEADER(Mi) = NON-ACK TCP HEADER(Mi+1)?
NO
1505
DISCARD (Mi+1)
1506
IS Mi+1 THE LAST MESSAGE ON THE QUEUE?
YES
1507
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1508
ENQUEUE(Mi)
1509
STOP
1510

FIGURE 15

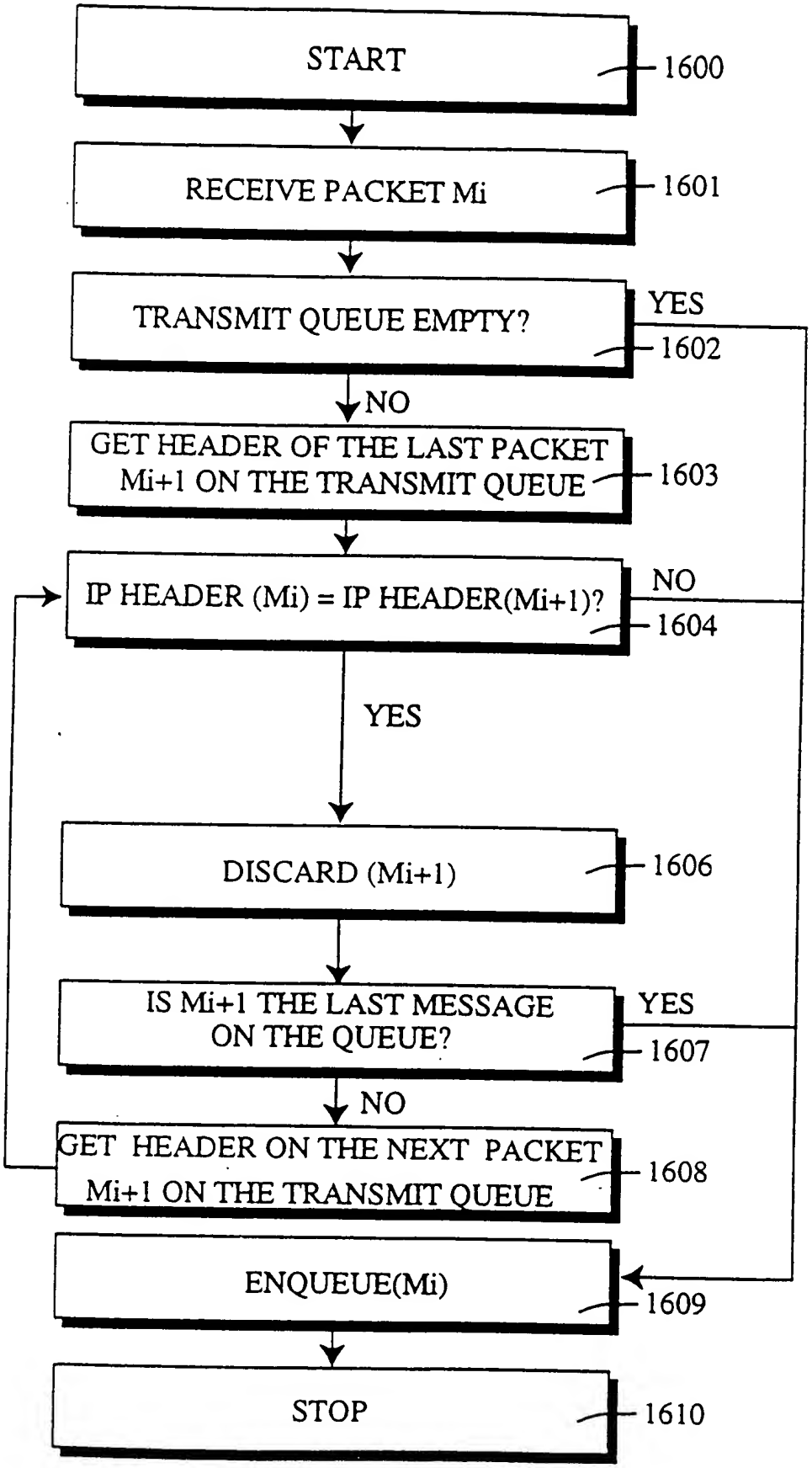
START
1600
RECEIVE PACKET Mi
1601
TRANSMIT QUEUE EMPTY?
YES
1602
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1603
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1604
YES
DISCARD (Mi+1)
1606
IS Mi+1 THE LAST MESSAGE ON THE QUEUE?
YES
1607
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1608
ENQUEUE(Mi)
1609
STOP
1610

FIGURE 16

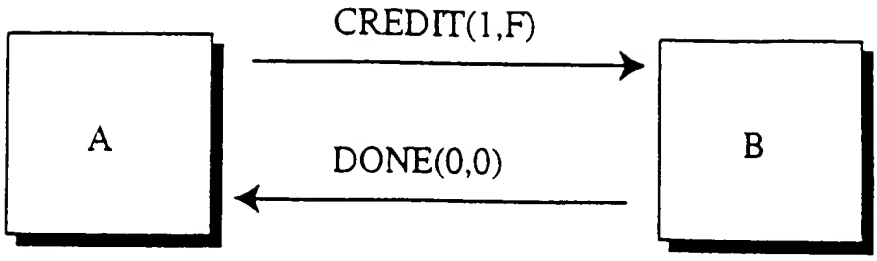

FIGURE 17

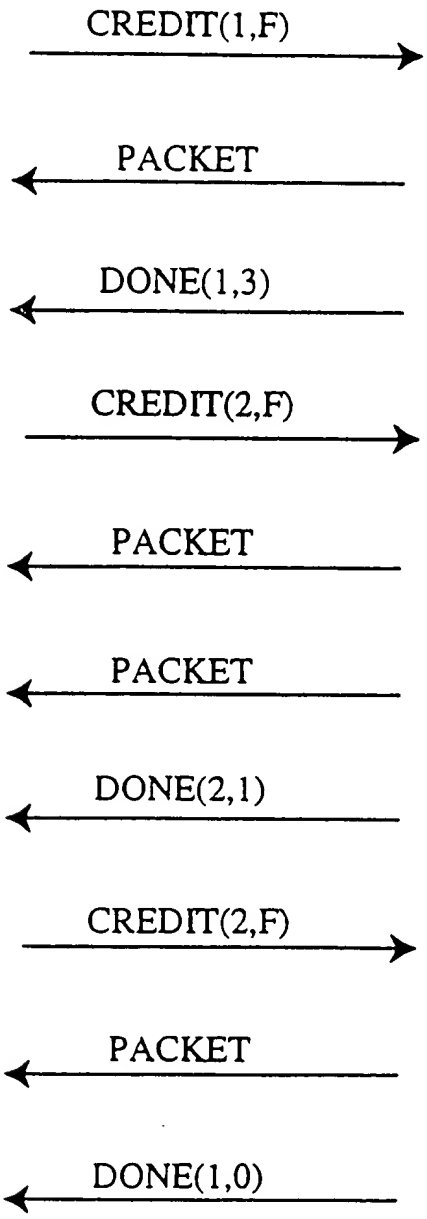

FIGURE 18

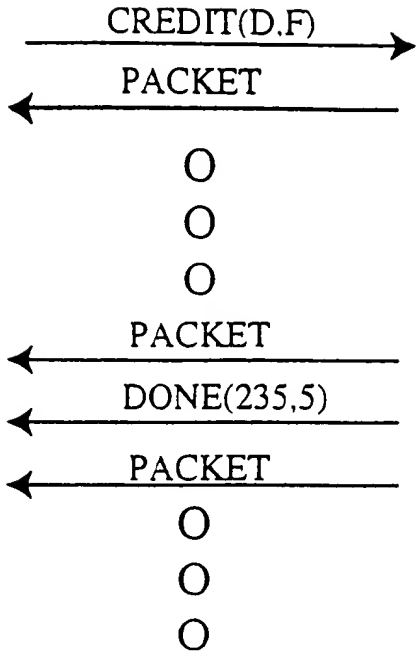

FIGURE 19

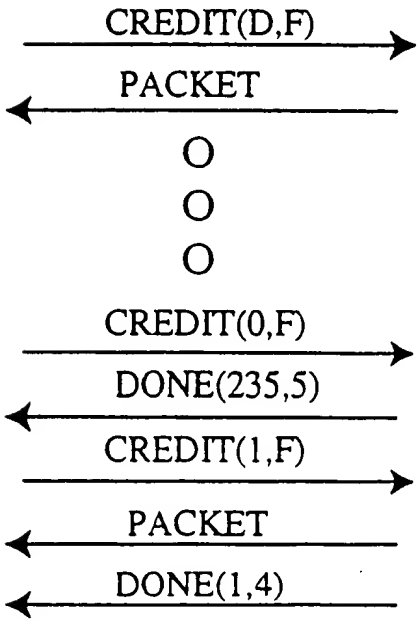

FIGURE 20